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Improving Health Care Provider Availability Through Information Technology

eUCAPERS

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Improving Health Care Provider Availability Through Information Technology

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ABSTRACT

The objective of this study was to determine if the use of information management would lead to the successful implementation of eUCAPERS and increase provider availability. The study examined identification of a need, information gathering methods, implementation, and evaluation of eUCAPERS. The study was conducted as a limited users project to determine if hospital-wide implementation should continue. The study compared total time available (TTA) and patient care time (PCT) reported by 28 providers (10 intern/residents and 18 staff) during a 4-month period, November to December 2004 (pre-implementation) and January to February 2005 (post-implementation), to determine if the implementation of eUCAPERS resulted in a statistically significant change in provider productivity. The results of study revealed that the sample's increase in patient care time (18%) was statistically significant, $F(1,28) = 24.47$, $p < .05$. The study also determined the decrease in TTA (1,882 hours) were statistically significant, $F(1,28) = 8.87$, $p < .05$. Based on these positive preliminary results, it is recommended that the hospital continue with full implementation of eUCAPERS hospital-wide.

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Introduction

Tripler Army Medical Center (TAMC) located on the island of Oahu, Hawaii serves as the primary Level III medical treatment facility for an estimated 800,000 Department of Defense and Department of Veterans Affairs healthcare beneficiaries. Tripler employs over 900 healthcare providers in over 80 medical specialties and sub-specialties. Included in the providers are various levels of expertise ranging from first year graduate medical interns to board certified physicians with more than 25 years of medical practice.

Tripler is the major medical teaching facility in the Pacific Regional Medical Command. It provides graduate medical training in more than 13 different professional healthcare areas.

Conditions That Prompted The Study

In May 2003, the Chief of Resource Management directed the establishment of a working group designed to evaluate the business processes that Tripler Army Medical Center (TAMC) employs to capture healthcare provider time data to determine if the quality and access of the data could be improved. The group was comprised of the Chief of the Resource Management Division, the nurse methods analyst, Chief of the Information Management Division (IMD), Chief of the decision support branch, a Medical

Expense Performance Reporting System (MEPRS) Analyst, and representatives from IMD, Department of Pediatrics, Schofield Barracks Health Clinic.

The group determined that for reporting time data to the Army Medical Command, the standard system is the Uniform Chart of Accounts Personnel System (UCAPERS). The UCAPERS is the Army's component of the Medical Expense Performance Reporting System (MEPRS), which are the foundation for many medical decision making modalities in the Department of Defense (Department of Defense Instruction [DODI] 6010.13, 2000, p. 8). The MEPRS provides a standardized method of comparing cost, personnel utilization, and efficiency of the military medical services. All expenses required to operate the medical facility are captured in MEPRS, including personnel costs, supply and equipment expenses, housekeeping, utilities, temporary duty (TDY), and support costs such as security, transportation, space, and facility maintenance (DODI 6010.13, 2000, p. 313). These costs are processed in a standardized format and applied against performance factors such as patient visits, occupied bed days, and dispositions (DODI 6010.13, p. 314).

The MEPRS data facilitates the establishment of enterprise metrics, determination of bid price adjustment (BPA) to TRICARE contracts, and various other budgetary and operational

modalities (DODI 6010.13, 2000, p. 9). Managed care support contracts (MCSC), such as the TRICARE contract, are competitive, fixed-price, at-risk contracts (Montgomery, 1997). The contractor's bid price is the sum of the administrative and healthcare costs and profits and is based on data collected during a data collection period (DCP) (Montgomery, 1997). In order to ensure fair and equitable management of the contract, a bid price adjustment (BPA) clause is included in the contract. The clause allows only the actual healthcare costs to be adjusted. An example of a warranted BPA is the occurrence of a higher number of network referrals than the number of referrals recorded during the DCP. Because the actual number of referrals exceeds the number during the DCP, an adjustment takes place, and the medical treatment facility (MTF) pays the contractor an additional amount to compensate for the increased volume of referrals. Minimizing the use of network services is a critical task for the MTF commander/chief executive officer. In order to minimize the use of network service, the MTF must increase its ability to produce healthcare using its available resources. As a result of the need to produce more healthcare, healthcare administrators must be able to monitoring the amount of time a physician spends performing functions that effect productivity. UCAPERS provides this data, but the process of collection

results in outdated data that does not allow leaders to make timely modifications to provider behaviors.

The UCAPERS subsystem of MEPRS is used by Army MTFs to track personnel time and apportion that time to the various departments in five basic categories: patient-care, administrative, graduate medical education, readiness, and other (e.g. vacation). The UCAPERS data are combined with a civilian pay interface, the composite pay rates for military personnel; data collected from contractor man-hours, and associated expenses in order to produce management reports (EDS, 2002, p. ii).

The main concern with the UCAPERS database is the process used for data collection. Tripler is required to report UCAPERS data as a part of MEPRS every 30 days (DODI 6010.13,2000, p. 249). Historically, the resource management division (RMD) sent each clinic and ward a monthly timecard for each provider (D. McGue, personal communication, September 8, 2004). Some departments of the hospital developed their own methods for reporting time data to RMD, but the majority of the hospital used the manual timecard. On this manual timecard each provider recorded his or her time according to the UCAPERS guidelines. Each provider's timecard was subsequently returned to the RMD no later than 15 days after the end of each month. Once the

resource management division received the timecards, the MEPRS data clerks performed appropriate calculations to assigned percentages of hours spent by the providers in each hospital area. The clerks, then, manually input the data into the UCAPERS database. If the providers failed to meet the 15-day deadline, RMD generated a delinquency report and forwarded it through appropriate channels. The process of generating delinquency reports occurred two more times, once at 21 days and once at 28 days. If the provider data was still not received by the 35th day after the end of the reporting month, the UCAPERS default of 8 hours per day (168 per month) was used (DODI 6010.13, 2000, p. 237). The entire reporting process took as long as 60 days to complete. The time required to generate the delinquency reports was an additional concern for the working group.

The working group identified that the current process produced secondhand data that was 45 - 60 days old. These data were used to make critical decisions regarding cost allocation, budgeting, and staffing levels along with a host of other business evaluations, thus it was imperative to have accurate and timely data. The group concluded that the current methodology used to capture and apportion employee work time was severely cumbersome, highly error prone, and less than timely (D. Dudevior, personal communication, September 23, 2004). The

decision was made by the working group in consultation with the hospital leadership to seek a replacement or enhancement for the UCAPERS.

Over the course of the next three months the UCAPERS working group developed the minimum functional requirements that a new system must meet (L. Nolan, personal communication, September 22, 2004). The group concluded that a new system must have the following basic capabilities: auto-feed to UCAPERS, MEPRS/UCAPERS business rules enforcement, administrative reports function, managerial validation and correction capability, productivity reports functions, access security (controlled access to certain software capabilities), electronic certification, delinquency reports function, and have exportable products to MS Excel®. Additionally, the new system must have the ability to flag problems as input occurs, have a user-friendly interface, and have a calendar input to flow to provider's individual data entry (L. Nolan, personal communication, September 8, 2004). Only the Vecna® product provided all of these capabilities.

The development of these system requirements was partly fueled by the Office of the Assistant Secretary of Defense for Health Affairs (OASD/HA) and the TRICARE Management Activity (TMA) in Washington, D.C. notifying certain military MTFs of the

impending change to the methodology for budget allocation. In the past, budgets were appropriated based on enrollment, but the new methodology for budget allocation would be based on a prospective payment system (PPS) (D. Petray, personal communication, November 8, 2004). Tripler was notified that 25% of its fiscal year 2005 operation budget would be awarded based on the PPS budgeting plan. Under PPS, budget allocation for the next fiscal year would be based on a projected level of productivity for that year. The projected level of productivity was derived from historical productivity and submitted to TMA in the form of a business plan. Once implemented, the new budgeting method would carry a penalty for failure to meet the proposed productivity. Failure of an MTF to meet projected productivity levels could result in a reduced or partially recouped budget by the higher headquarters, U.S. Army Medical Command (D. Dudevior, personal communication, September 23, 2004) Having received this information, the UCAPERS working group was compelled to find a system that would improve the hospital's ability to accurately capture the time accounting data of the physicians. They realized the need for a system that would enable leaders to make timely adjustments in the areas of the hospital that were less productive or that were failing to meet the business plan. Additionally, the hospital leaders needed the ability to

reallocate scarce resources in order to boost productivity. The hospital required a tool that provided the information necessary to explain the reasons why productivity was less than optimal.

In February 2004, the UCAPERS working group briefed the Performance Improvement Committee (PIC) concerning three potential replacement systems; the Schofield Barrack's program, Kamal Pope's program, and the Vecna® program. Tripler spoke on numerous occasions with OASD/HA concerning the pending implementation of the Defense Medical Human Resources System - internet (DMHRS-i) program. Mr. David Gervais told Tripler that DMHRS-i did not meet the requirements that were sought by Tripler. Mr. Gervais also stated that implementation at Tripler was at least 36 months away (D. Gervais, personal communication, September 23, 2004). As result of the statements made by the OASD/HA Tripler elected to continue with its current course of action.

The health clinic at Schofield Barracks developed a software program that aided in capturing time data. The Department of Surgery at Tripler used a program developed by Kamal Pope, an employee in the department. The Vecna® program, eUCAPERS, was a MS Windows® -based program, which was used by Madigan Army Medical Center several years ago. Each of the potential candidate programs was evaluated using specific

criteria and assigned values using a decision matrix, as shown in Figure 1.

Following the briefing to the PIC, the PIC approved the Vecna® program in concept by a vote of 7 to 2, but requested a cost analysis of the program (Henry, 2004). As a result of the approval vote, the working group began putting together a business proposal to brief the Executive Committee (EC). On May 12, 2004, the group briefed the EC (Nitta, 2004). The VECNA® product was approved at a capital budget cost of $130,000, as shown in Figure 2.

Statement of the Problem

Will Tripler Army Medical Center's successful implementation of the Vecna® program, eUCAPERS, result in an increase in provider productivity?

Literature Review

Program Implementation

To remain competitive in the business world organizations, including those in the health care marketplace, must understand that change is a requirement (O'Malley, 2002). The increasingly cost-conscious consumer, the development of new technologies, and the appearance of new marketing strategies are three reasons that precipitated the need for change in the health care industry (Stock, 1993). Implementing change in an industry in

which 80% of the consumers already cannot afford to pay for the services out of their pockets requires deliberate and intensive planning (O'Malley, 2002).

The main emphasis of implementing change in the healthcare market for many years has been to keep costs down (Widra & Fottler, 1988). The cost to the consumer who purchases the healthcare, and the cost associated with the production of healthcare are equally important. For the purpose of this paper the latter is considered. Manufacturing a good or service more efficiently results in a lower cost to the producer, which translates to a lower cost for the consumer. The problem lies not in identifying how to improve efficiency, but how to implement a new program in such a way that it becomes part of the organization's culture (Meyers & Robbins, 1991).

Implementing change is a process (Antrim, 1998). A process if thoroughly planned can be very successful but if rushed can be disastrous. Strategists have different ideas about the process for successfully implementing a change within an organization. Although their ideas differ, their methodology almost universally includes five key elements. In addition to the five keys, which will be enumerated later, the experts agree that the most important thing to remember when implementing change is communication. Maintaining good communication

throughout the process starts by determining which systems need to be instituted to foster good communication and eliminating those that hinder communication (Jeffries, 2003). Leaders must remember that communication goes both ways. A good communication campaign emphasizes multiple mediums: newsletters, emails, one-on-one's, and conferences (Harrison, 2000). Antrim (1998) explains that most people need a compelling reason why they should accept a new of way doing things and abandon the old way. The reason for change must be in the best interest of the not only the organization but also of the individual. Proper communication starts early in the process and is continuous throughout (Holman, 2000).

The first key is defining the need for a change. Analyzing the gap between where you are now, present situation, and where you want to be, the intended goal, is the first step (Cleese, 1998). The gap may have been created by budgetary, technological, or competitive requirements. By analyzing the gap, functional requirements and metrics for measuring success of the new program can be developed (Jeffries, 2003; Hallowell, 2003). This analysis aids leaders in determining if a gap actually exists. Townsend and Gebhardt (1997) warn that organizational leaders should never institute change for change's sake. If employees feel that the leadership is making

changes to follow a fad, the relationship between the followers and leaders will be strained. Defining a durable change, one that does not fade when the leadership changes, requires not only knowing what the change should be, but also what has caused the need for the change (Harrison, 2000). If the need for change is based on public policy, consideration must be given to whether the precipitant will survive the test of time (Mesquita, Siverson & Smith, 1999).

The second key is to assess the climate. Is the climate right for change? In the healthcare industry there are increasing pressures and stressors to implement cost containment modalities. Pressure from the government, pressure from managed care organizations, and pressure from the purchasers of healthcare (employers) make the necessity for improvement apparent (Widra & Fottler, 1988). Assessing the climate not only includes evaluating the external environment, it also includes an assessment of the environment internal to the organization. Assessing the stress level of employees is critical (Harrison, 2000). Questioning whether a change to a particular aspect of the business process will increase or decrease stress levels is paramount to understanding the potential success of implementing change.

An assessment of how other intra-organizational areas might affect the change cannot be ignored. In healthcare, attempts to change a specific area such as clinical care, logistics, or resource management have failed because of the inability of the leader to recognize the interdependence that occurs. To avoid the "…Domino Effect…" consideration must be given to the impact that changing one area might have on other areas (Hallowell, 2003).

The third key is stakeholder buy-in. This step is not mutually exclusive; rather it is to be considered throughout the implementation process. Identification of all entities that could be affected by the impending change is crucial to its survival. Marketing the idea, program, or policy to all stakeholders is cardinal. Understanding how to market will pay huge dividends. Covey (1995) states that to make a change, successful leaders must make it personal to their subordinates. Making people feel excited about the possibilities and giving them a voice will improve the likelihood of achieving positive results (Holman, 2000). New programs and new systems require sponsorship (Harrison, 2000). Sponsors are those individuals who will champion the cause. They provide the business context and rationale to others by spreading positive aspects of the impending change.

The fourth key to successful change is to establish accountability. Antrim (1998) states that recognizing and rewarding the successes of individuals as well as departments aids in establishing accountability. The timing of this recognition is very important to the overall success of the program. Townsend and Gebhardt (1997) discuss the importance of recognition early. Establishing accountability is also holding people responsible for the failures, which must also occur early and often (Myers & Robbins, 1991).

The fifth key to success implementation is the removal of the old way. If the old program, system, or tool is still accessible then it will certainly to be used. If a new program is to survive, the old way must be entirely removed from the equation (Covey, 1995).

Measures of Productivity

Healthcare productivity is measured based on a relative value scale. The relative value scale is an index that assigns weights to various medical services (Henderson, 2002). Cleverly and Cameron (2003) define relative value units (RVU) as a "measure of the relative resources that are consumed as a result of a healthcare procedure." The military health system (MHS) uses RVUs to measure outpatient productivity and relative weighted products (RWPs) to measure inpatient productivity. An

RWP is a DoD measure of workload that represents the relative resource consumption of a patient's hospitalization as compared to that of other inpatients (DODI 6070.2, 2002) inpatients.

Productivity

The MTF's loss of healthcare providers due to deployment to theaters of combat caused an escalation in network costs and a loss of market share according to M2 data as of June 7, 2005. Since 1990, the number of military deployments actions is more than 16 times the level of the preceding 35 years (Holzer, 2000). The MHS must take necessary steps to stop this trend and decrease the amount of purchased care. In order to facilitate this endeavor, the Assistant Secretary of Defense for Health Affairs (ASD(HA)) has set performance expectations for the MHS. The four major performance areas outlined in the defense health care program (DHP) performance contract are unit cost and productivity, quality and customer responsiveness, access, and public health (Office of Assistant Secretary of Defense (Health Affairs), 2003). In the area of unit cost and productivity, several performance measures have been delineated, which provide medical treatment facilities (MTF) with metrics to measure success of meeting the goals. In terms of provider productivity, the MHS goal was set at 14.5 RVUs per provider full time equivalent (FTE) per day for fiscal year 2004. An FTE is

operationally defined as 168 hours per month (D. McGue, personal communication, September 9, 2004). For the Army specifically, the DHP performance plan requires an average of 15.4 RVUs per provider FTE per day (Office of the Assistant Secretary of Defense (Health Affairs), 2003). At the time of inception, the annual goal was to increase by 1.0 RVU per provider per day, each year following 2004. The Army, Navy, and Air Force have since challenged this guidance. The final decision, to continue to increase 1.0 RVU per provider per day each year, has not been made by ASD(HA) (D. Smith, personal communication, October 1, 2004). In order to meet the current goal established by the ASD(HA), Army MTF's must produce at the rate of 1.925 RVUs per hour per FTE.

Prospective Payment System

During the 1980s, medical costs were growing at a much faster rate than the rate of inflation (Henderson, 2002). From 1980 to 1989 the average inflation rates was 1.47% while medical care costs increase averaged 11% during the same period (National Aeronautical Space Administration, 2005). In order to decrease government healthcare expenditures, the Center for Medicare and Medicaid Services implemented a prospective payment system (PPS) for short-stay inpatient hospitals (Shi & Singh, 2002). Under the PPS, payment to hospitals was based on an

expected cost of an episode of care as opposed to the cost-plus method. The expected cost amount was established based on a diagnosis-related group and was set per discharge. If the actual cost of the care was less than the expected cost, the hospital made a profit. Conversely, if the actual cost was greater than the expected cost, the hospital lost money. This concept placed an emphasis on limiting hospital admissions and increasing early discharges.

Purpose

Tripler Army Medical Center purchased the eUCAPERS program from Vecna®. Madigan Army Medical Center (MAMC) used this program approximately 2.5 years ago (S. Samuela, personal communication, September 20, 2004). Madigan implemented a limited user trial, but was unable to effectively implement the system hospital-wide. Madigan abandoned the program because its IMD section tried to change the software and caused the integrity of the program to collapse. Madigan's leadership did not want to appropriate the additional funds required to have VECNA® return and fix the problem (S. Samuela, personal communication, September 20, 2004). The eUCAPERS system that Tripler purchased incorporated the capabilities that Madigan had tried to add, which caused the system failure. The purpose of this study is to use a pre-test and a post-test data comparison

to determine if the successful implementation of eUCAPERS resulted in increased provider productivity.

Methods and Procedures

Scope of Data

To determine if eUCAPERS was a viable alternative for hospital-wide usage, the initial implementation protocol was limited to the Department of Pediatrics.

Data sources

This study evaluates the percent of total time available that each provider spends in direct patient care. The higher the percent of the total available time that is spent is in direct patient care equals more time producing healthcare. It is therefore a reasonable assumption that an increase in the percent of patient care time, availability, directly correlates to an increase in productivity.

A power analysis was performed to determine what sample size was required, with 80% certainty, to realize a 15% change in percent patient care (PPC) using SamplePower®, an SPSS Incorporated program, see Appendix H. A sample of convenience of Pediatric providers (n=28) was divided according to work experience (staff (18) and intern/resident (10)). For each provider two observations, pre-test (coded 1) and post-test (coded 0), were used for the analysis. Only the providers that

were assigned to the Department of Pediatrics for the entire period (November 2004 - February 2005) were used in the study. Only the patient-care time counts towards the prospective payment reimbursement methodology; therefore, this time was used to calculate provider productivity. The other categories of time data were aggregated, total time available. The pre-implementation data (November - December 2004) were pulled from the legacy UCAPERS system. The post-implementation data were pulled from the VECNA® product, eUCAPERS, on March 29, 2005.

Calculations

The data were derived from two different systems. The data from the UCAPERS system divided the patient-care time into two categories, inpatient and outpatient. Using MS Excel®, the two categories were added together (inpatient time + outpatient time = patient care time) to render the total patient care time (PCT), independent variable. Total time available (TTA), independent variable, was operationally defined as the aggregated time from all time entry categories. Finally, the PCT was divided by the TTA (PCT / TTA = percent patient care), which resulted in percent patient care (PPC), dependent variable. The data were analyzed using the Statistical Program for Social Sciences® version 12.0 (SPSS). Descriptive statistics were calculated for the sample. The data were analyzed using a two-

way analysis of variance (ANOVA) for repeated measures in the same subject, where the two factors were Pre and Post observations (1 = pre-test, 0 = post-test) and Intern/Resident and Staff (group). A post hoc analysis was performed to determine which specific means were different from one another by using a Least Significant Means Student's *t* test. The alpha level set at .05 ($\alpha = .05$).

Validity and Reliability

Tripler is a teaching hospital, which results in a high level of personnel transitions. The transitions occur as a result of clinic-to-clinic transfers, residency rotations, and departures from the hospital completely. To compensate for the potential loss of subject data, only data for individual providers that were assigned for the entire time period covered by the study were used. This compensation resulted in minimal effect on the clinical aggregated data. The reliability of the study was maximized through the use of the Department of Pediatrics as it had been chosen multiple times in the past to serve as the test site for new hospital programs (Cooper & Schindler, 2003).

Results

The results of this study demonstrated that the eUCAPERS program increased provider productivity. The mean of the PCT

increased by 36 hours. The mean of PPC increased 18.1%. The mean of the total time available decreased by 67 hours and a total of 1,882 hours. Both groups' recorded statistically equal decreases in TTA, see Figure 4. Twenty-three of the 28 providers demonstrated an increase in the PPC. Only 5 providers revealed a decrease in the PPC (1 intern/resident, 4 staff providers). These results were statistically significant, $F(1,28) = 24.47$, $p > .05$. Figure 3 depicts that the changes in PPC of each group were not statistically significantly different from one another. Each groups' respective increase was paralleled by an increase in the other.

The two-way analysis of variance revealed a several statistically significant differences. The group variable, intern/resident and staff, demonstrated a mean difference that was statistically significant, $F(1,28) = 8.32$, $p > .05$, for the PPC. For the PCT, the increase that occurred over time was almost significant, $F(1,28$, $p = .058$. Within groups the increase for PCT was statistically significant, $F(1,28) = 20.13$, $p < .001$.

A detailed analysis of the Least Significant Means Student's t test (see Appendices E-G) reveals several interesting interactions. Statistically significant differences were discovered for percent patient care time and total time

available for interns/residents pre-test and post-test results. Within the staff group statistically significant differences also resulted between pre-test to post-test observations.

Discussion

The implementation of the eUCAPERS resulted in an increase in provider availability. The implementation of eUCAPERS by Tripler follows the concept that information management has become increasingly important with the advent of new technologies. Information management includes data management and data dissemination activities in all parts of the organization from individual to group problem identification, information, search, evaluation, and implementation (Bass & Avolio, 1993; Mintzberg, Rasinghani, Theoret, 1976). Using the concept of information management, the Tripler staff identified the need to improve the data quality of the provider time capturing method. After gathering the information and evaluating alternative methods for achieving this goal, the decision was made to implement eUCAPERS. Secondarily, the goal was to provide clinical leadership with a tool that could be used to help them optimize provider activity.

The main objective, improve data quality, was achieved by placing the responsibility for data entry directly on the provider effectively eliminating secondhand data. This was

achieved through the development of eUCAPERS business rules. The business rules stated that the individual provider, as opposed to a clerk, was directly responsible for time data entry. The rules also mandated that the time data entry occur daily instead of monthly as it had been done in the past.

The latter business rule posed a potential avenue of failure for the program. During the post-data collection period (January - February 2005), aggregate reports on all the subjects in the study were pulled daily to monitor progress of the time reporting. These reports revealed that most of the subjects (16) were not inputting their data daily and many of them (9) were not inputting weekly. The failure of providers to report on a weekly basis further demonstrated that the second objective was not achieved. It was not achieved because the clinical leadership did not review the clinical data daily or weekly to determine if any adjusting of schedules or templates was needed. If the leadership was reviewing the data, the fact that the majority of the providers had zero reported time after a week of working would have caused the leadership to adjust the provider's behavior. If the clinical leadership does not begin to review the eUCAPERS data at least weekly, this program has the potential to fail to provide added value to the organization.

Within the confines of the stated problem of this study were two critical points, successful implementation and increased provider productivity. Successful implementation must include the following five steps: define the need for a change, assess the climate, stakeholder buy-in, establish accountability, and removal of the old way (Antrim, 1998; Covey, 1995; Jeffries, 2003; Hallowell, 2003; Harrison 2000; Widra & Fottler, 1988). The only step successfully achieved was the removal of the old way. The other four steps were marginally achieved.

The research indicated that the reason for the failure to achieve all five steps was a lack of good communication. During the implementation process, the personnel that were most affected by the impending change were left out, according to one physician. During an interview with a senior physician, he said, "the administrators identified a problem that they have, and they developed a solution without discussing it with those who would be most affected by it." Another interviewee stated that he had not heard about eUCAPERS until he was told to attend mandatory training in the auditorium the next day. These examples indicated that communication from the leadership at all levels to their respective subordinates was impaired. The eUCAPERS project group had briefed the PIC on three separate

occasions over a period of 14 months. In attendance at the PIC were the senior leaders from every department within the hospital. The communication broke down between the departments' senior leaders and their subordinates.

Another example of communication failure was identified during the training phase of the implementation. The implementation of eUCAPERS occurred in three phases. The first phase was the system integration performed by VECNA personnel. The second phase was mandatory training that all users (administrators and providers) attended. The third was limited users implementation in the Department of Pediatrics. The training phase consisted of attending 1 of the 10 training sessions offered for each type of user (provider and administrator). The intent of the training sessions was to demonstrate how to use the system. However, during these training sessions, it became clear that this was the first time most of the providers had heard about this system, despite the fact that it was 14 months in the making. During each training session, the project officer spent the majority of the scheduled class time defending the need for the system as opposed to how to use it.

During each training session, the project officer briefed the concept of the system. He stated that the provider would be

responsible for inputting the data directly into the system. Previously, the data was passed to a clerk for input. By making the provider put the data directly into the system, the quality, accuracy, and timeliness of the data would be significantly improved. Several providers negatively perceived this concept. One provider was overheard saying; "now a GS-5 is worth more to the organization than a physician." The project demonstrated successful empirical results, but the implementation process fell short of successfully achieving all of the five key steps.

The second critical point of the problem statement was increased provider productivity. The results of the study revealed an increase in patient care time (PCT). Conversely, the total time available (TTA) dramatically decreased (1,882 hours). The decrease in TTA equated to more than 11 FTEs. Even though this study did not consider RVUs or patient encounters, it could be inferred based on the data gathered from the pre-implementation period, that if eUCAPERS was not implemented, the Department of Pediatrics would have appeared to be less productive. For example, if the department produced 4,000 RVUs, under the old UCAPERS system those 4,000 RVUs would have been divided by 1,882 more hours. Furthermore, by increasing PCT and reducing TTA, the hospital experienced an improved efficiency. Under the prospective payment system, provider's who were more

efficient, that is to say they worked less hours but achieved the same or higher productivity levels, added value to the organization. Considering the reluctance of the providers to use this program, the Hawthorne Effect can clearly be ruled out as a contributor to the success of the project.

Limitations

Application of the results of this study was limited by a key assumption made at the beginning of the project, increased patient-care time equals increased productivity. Due to time constraints, several key pieces of data that could have improved the applicability and validity of the results were not available. First, the relative value units (RVUs) that were generated during the post-implementation data collection period were not available prior to the conclusion of the project. The lack of this data was known to be a limitation from the onset of the study because of the time required to code the patient encounters. If the RVU data were available, true productivity measurements could have been determined.

A second limitation of this study revolved around the sample size and sample type. The entire provider population of the organization numbers over 900 from over 80 specialties, but the sample studied was 28 pediatric providers. The small sample size resulted from the continued delaying of the start of the

project. The original start date for the project was October 2004, but the start date was repeatedly delayed until January 2005. If it had started on time, the project would have included additional providers and provider types. By including different provider types (surgeons, office-based physicians, and other primary care specialists) the results would likely be more applicable to other healthcare institutions.

Recommendations for Future Research

The results of this study pave the way for several additional research projects. In order to demonstrate a true increase in provider productivity, the results of this study could be coupled with the RVUs and patient encounters that were generated during the priori and the posteriori data collection periods. Another potential follow-on study involves a qualitative evaluation of the next implementation project to determine if the organization's leadership learned from the mistakes that were made during the implementation of eUCAPERS.

Conclusion

As the military healthcare system continues to place more emphasis on improving business operations, organizations like Tripler Army Medical Center are forced to seek ways to improve business processes. The implementation of eUCAPERS demonstrated an initial success towards that endeavor. The eUCAPERS program

enables the provider to input time data on a daily or weekly basis as opposed to the legacy program UCAPERS, which restricted data input to up to 45 days after the occurrence. Because of this restriction, the legacy system provider time data was highly error-prone. The potential that the provider failed to accurately capture the true amount of patient care time is highly likely. The UCAPERS program is a tool that managers can use to adjust provider behavior before the report period ends. However, the initial successes demonstrated by the implementation of eUCAPERS system may not continue if the clinical leadership does not take a more active role in monitoring the progress of the program. As hospital-wide implementation continues, data from different departments should be analyzed periodically to determine if the initial successes of the program continue. As a final recommendation, a one-year follow-up for the Department of Pediatrics' providers should be initiated during fiscal year 2006.

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Appendix A

Figures

Figure 1.

	Significance	S.B.*	Kamal Pope's	VECNA
Screening Criteria				
Captures In & Outpatient Time		0	1	1
Scaleable		0	1	1
		Eliminated		
Evaluation Critieria				
Calendar Function			1	1
Standard vs. Proprietary (S=1)	Cost sharing in modifications/AMEDD application		0	1
Electronic Transfer to UCAPERS	Time savings & human input error reduction		0	1
Validate Business Rules (MEPRS)	Instant feedback to providers		1	1
Ability to Generate Productivity Reports	Real Time Metrics to gauge performance		0	1

* Schofield Barracks Army Health Clinic Program

Figure 2.

Year		0	1	2	3	4
Rate	**3.00%**					
Expenditures						
VECNA - Auto-UCAPERS		($110,000)				
IM Support Personnel (1/4 FTE)		($20,000)	($20,000)	($20,000)	($20,000)	($20,000)
Savings						
RM Personnel Reduction		$20,000	$40,000	$40,000	$40,000	$40,000
Department of Surgery			$2,500	$2,500	$2,500	$2,500
Department of Pediatrics		$4,000	$4,000	$4,000	$4,000	$4,000
Schofield Barracks			$4,000	$4,000	$4,000	$4,000
RM Overtime			$2,000	$2,000	$2,000	$2,000
Sum of Cash Flow	$24,000.00	($106,000)	$32,500	$32,500	$32,500	$32,500
Net Present Value	**$14,374.46**					

Figure 3.

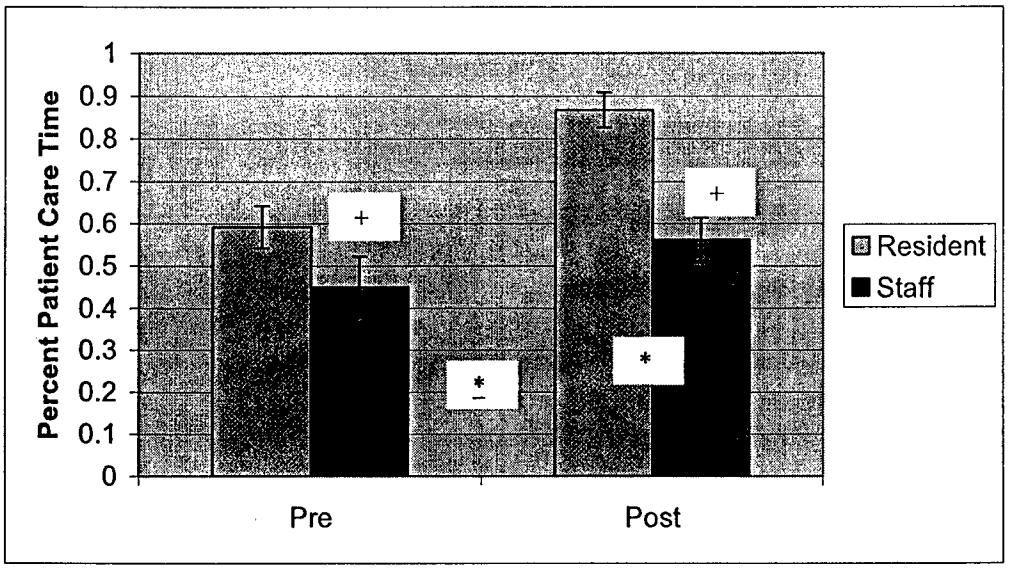
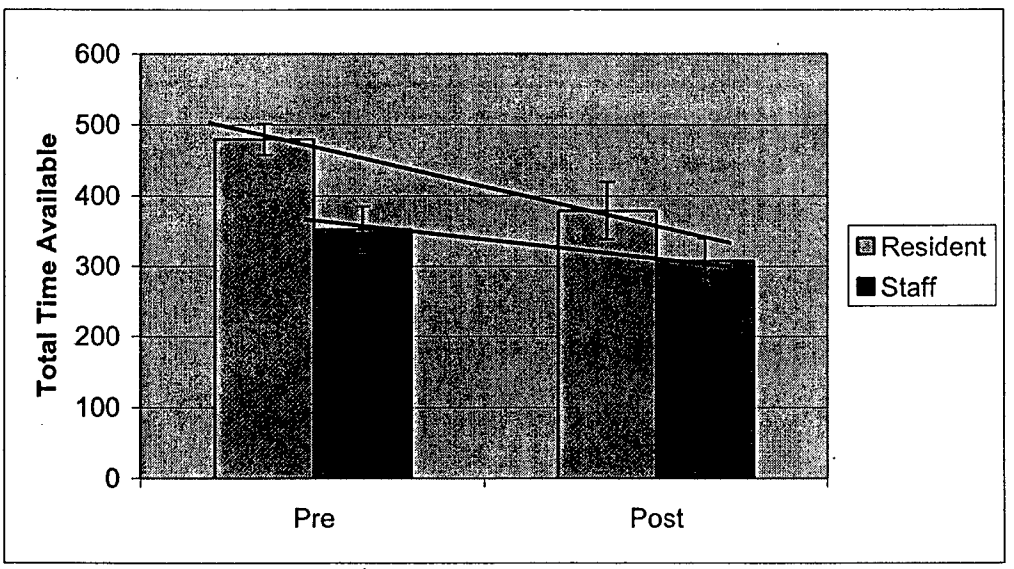


Figure 4.



Appendix B

Figure Captions

Figure 1. The Schofield Barracks program (S.B.) was eliminated by the screening criteria. The only product that met all criteria was the Vecna® product. Presence of the criteria equals one, absence results in a zero.

Figure 2. Depicts an initial outflow of capital equaling $130,000 and the savings from the reduction of one full time equivalent (FTE) and elimination of proprietary software in three departments. The payback is realized between 36 and 48 months.

Figure 3. The percent patient care recorded by the sample increased as a result of the implementation of eUCAPERS. ($\underline{I}$ represents the standard deviation of each group, $\underline{*}$ represents the main effect of resident/intern versus staff $p < .007$, + represents the main effect of pre versus post observations $p < .001$, * represents the main effect of pre versus post for each corresponding group, $p < .05$).

Figure 4. Means of the group between observations are not significantly unparallel, which demonstrates no significant interaction among groups between observations, $F(1,28) = 1.251$, $p = .273$.

Appendix C

Date Set

	Pre Data			Post Data			Net Changes		
Provider ID	Patient Care	Total Available Time	% Patient care	Patient Care	Total Available Time	% Patient care	Net Change in Total Time available	Net Change Patient-care Time	Net Percent Change in Patient Care Time
IR1	305	436	0.70	354	374	0.95	-62	49	0.25
IR2	304	434	0.70	525	555	0.95	121	221	0.25
IR3	356	521	0.68	485	537	0.90	16	129	0.22
IR4	103	459	0.22	141	141	1.00	-318	38	0.78
IR5	314	469	0.67	477	552	0.86	83	163	0.19
IR6	318	558	0.57	273	321	0.85	-237	-45	0.28
IR7	297	485	0.61	137	287	0.48	-198	-160	-0.14
IR8	215	562	0.38	260	300	0.87	-262	45	0.48
IR9	374	535	0.70	284	312	0.91	-223	-90	0.21
IR10	251	503	0.50	425	483	0.88	-20	174	0.38
S1	242	310	0.78	272	304	0.89	-6	30	0.11
S2	0	408	0.00	154	328	0.47	-80	154	0.47
S3	4	425	0.01	20	180	0.11	-245	16	0.10
S4	94	267	0.35	114	304	0.38	37	20	0.02
S5	243	448	0.54	77	121	0.64	-327	-166	0.09
S6	6	64	0.09	12	62	0.19	-2	6	0.10
S7	229	229	1.00	245	270	0.91	41	16	-0.09
S8	211	484	0.44	237	384	0.62	-100	26	0.18
S9	171	334	0.51	184	352	0.52	18	13	0.01
S10	214	295	0.73	195	323	0.60	28	-19	-0.12
S11	118	247	0.48	176	270	0.65	23	58	0.17
S12	128	384	0.33	205	294	0.70	-90	77	0.36
S13	355	479	0.74	344	578	0.60	99	-11	-0.15
S14	164	411	0.40	240	382	0.63	-29	76	0.23
S15	190	361	0.53	118	288	0.41	-73	-72	-0.12
S16	99	410	0.24	258	414	0.62	4	159	0.38
S17	157	597	0.26	262	525	0.50	-72	105	0.24
S18	158	158	1.00	150	150	1.00	-8	-8	0.00
TOTALS	5620.00	11273.00	0.51	6624.00	9391.00	0.68	-1882.00	1004.00	0.18

Appendix D

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PCT	56	0	525	218.64	119.967
percent	56	.00	1.00	.5937	.26444
tta	56	62.00	597.00	369.0000	134.76984
Valid N (listwise)	56				

Appendix E

Percent Patient Care Statistics

Summary of Fit	
Rsquare	0.723379
Rsquare Adj	0.707421
Root Mean Sq Err	0.143038
Mean of Response	0.59375
Observations	56

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	27	2.7821988	0.103044	5.0364
Error	28	0.5728766	0.02046	Prob>F
C. Total	55	3.8461125		<.001

Effect Tests

Source	Nparm	DF	DFDen	Sum of Squares	F Ratio	Prob>F
Group	1	1	28	0.1701306	8.3153	0.0075
Prepost	1	1	28	0.5006883	24.4717	<.0001
Subject&Random	26	24	28	1.5905152	3.23	0.0017
Group*Prepost	1	1	28	0.089474	4.3731	0.0457

LSMeans Difference Students t

Alpha=0.05 Q=2.04841

LSMeans[j]

Mean[i] - Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	Intern/Resid, 0	Intern/Resid, 1	Staff, 0	Staff, 1
Intern/Resid, 0	0	♦0.27545	♦ 0.31656	♦0.42833
	0	0.06099	0.09032	0.09032
	0	0.15052	0.13156	0.24332
	0	0.40039	0.50157	0.61333
Intern/Resid, 1	♦ -0.2755	0	0.04111	0.15287
	0.06099	0	0.09032	0.09032
	-0.4004	0	-0.1439	-0.0321
	-0.1502	0	0.22611	0.33788
Staff, 0	♦ -0.3166	-0.0411	0	♦0.11176
	0.09032	0.09032	0	0.04906
	-0.5016	-0.2261	0	0.1127
	-0.1316	0.1439	0	0.21226
Staff, 1	♦ -0.4283	-0.1529	♦ -0.1118	0
	0.09032	0.09032	0.04906	0
	-0.6133	-0.3379	-0.2123	0
	-0.2433	0.03213	-0.0113	0

LSMeans[i]

♦ Indicates statistically significant differences

Appendix F

Patient Care Time Statistics

Summary of Fit

Rsquare	0.667097
Rsquare Adj	0.647891
Root Mean Sq Err	71.18693
Mean of Response	218.6429

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	27	528050.77	19557.4	3.8593
Error	28	141892.2	5067.6	Prob>F
C. Total	55	791564.86		0.0003

Effect Tests

Source	Nparm	DF	DFDen	Sum of Squares	F Ratio	Prob>F
Group	1	1	28	102049.21	20.1377	0.0001
Prepost	1	1	28	19713.47	3.8901	0.0585
Subject&Random	26	24	28	237348.18	1.9515	0.0453
Group*Prepost	1	1	28	1906.32	0.3762	0.05446

LSMeans Difference Students t

Alpha=0.05 Q=2.04841

LSMeans[j]

Mean[i] - Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	Intern/Resid, 0	Intern/Resid, 1	Staff, 0	Staff, 1
Intern/Resid, 0	0	50.3636	♦ 160.713	♦ 187.183
	0	30.3542	38.4499	38.4499
	0	-11.814	81.9517	108.422
	0	112.541	81.9517	265.944
Intern/Resid, 1	-50364	0	♦ 239.474	♦ 136.82
	303542	0	110.349	38.4499
	-112.54	0	38.4499	58.0586
	11.8141	0	189.11	215.581
Staff, 0	♦ -160.71	♦ -110.35	0	-26.4706
	38.4499	98.4499	0	24.4169
	-239.47	-189.11	0	-23.545
	-81.952	-31.588	0	76.4864
Staff, 1	♦ -187.18	♦ -136.82	-26.471	0
	38.4499	38.4499	24.4169	0
	-265.94	-215.58	-76.486	0
	-108.42	-58.059	23.5452	0

LSMeans[i]

♦ Indicates statistically significant differences

Appendix G

Total Time Available Statistics

Summary of Fit

Rsquare	0.5813
Rsquare Adj	0.5572
Root Mean Sq Err	89.6757
Mean of Response	369

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	27	580789.87	21510.7	2.7649
Error	28	225168.53	8041.7	Prob>F

Effect Tests

Source	Nparm	DF	DFDen	Sum of Squares	F Ratio	Prob>F
Group	1	1	28	48889.01	6.0794	0.0201
Prepost	1	1	28	71368.05	8.8747	0.0059
Subject&Random	26	24	28	377030.11	1.9535	0.045
Group*Prepost	1	1	28	10064.05	1.2515	0.2728

LSMeans Difference Students t

Alpha=0.05 Q=2.04841

LSMeans[j]

Mean[i] - Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	Intern/Resid, 0	Intern/Resid, 1	Staff, 0	Staff, 1
Intern/Resid, 0	0	♦ -100.55	78.728	30.0809
	0	38.2379	48.5091	48.5091
	0	-178.87	-23.638	-69.285
	0	-22.219	175.094	129.447
Intern/Resid, 1	♦ 100.545	0	♦ 176.273	♦ 130.626
	38.2379	0	48.5091	48.5091
	22.2188	0	76.907	31.26
	178.872	0	275.64	229.993
Staff, 0	-75.728	♦ -176.27	0	-45.647
	48.5091	48.5091	0	30.7585
	-175.09	-275.64	0	-108.65
	23.6384	-76.907	0	17.3589
Staff, 1	-30.081	♦ -130.63	45.6471	0
	48.5091	48.5091	30.7585	0
	-129.45	-229.99	-17.359	0
	69.2855	-31.26	108.653	0

LSMeans[j]

♦ Indicates statistically significant differences

Appendix H

Power Analysis for Percent Patient Care

t-test for Paired Samples	Population Mean	Standard Deviation of the Difference	N of Cases	Standard Error	95% Lower	95% Upper
Mean Difference	15	20	28	3.78	7.34	22.66

Alpha = 0.05, Tails = 2, Power = 0.97